

# An Evaluation of Information Systems Students Internship Programs in Developing Countries: A Capability Perspective

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## Abstract

In this paper Sen's notion of capabilities served as a theoretical lens for assessing the effectiveness of internship programs for IS students and their contributions to human development. We use the key elements of the capability approach to focus on the developmental impact. We based our evaluation on IS students industrial work scheme in Nigeria. Our analysis shows that, even though the scheme has been designed to provide better opportunities for students in terms of practical education and employment, the lack of conversion factors makes the program contextually problematic. The study concludes with some recommendations for policy makers advancing an agenda for the improvement of IS education and internships programs for students in tertiary institutions.

## Keywords

IS education, internships, capability approach, developing countries.

## Introduction

Information and Communications Technologies (ICTs) are vital elements of the 21<sup>st</sup> century. ICTs play a critical role in advancing socio-economic development and specifically human capital development of a nation (Adedeji & Ayotunde, 2013). Governments of developing countries have adopted national policies that relate ICT-based education reform to socio-economic development (Kozman, 2005). Particularly the growth of IT industries and the more general use of ICTs for socio-economic development have resulted in the investment of IS education in universities of developing countries (Heeks, 2006). Most, if not all, IS degree curriculums contain an internship program where students are expected to gain work experience in the areas of information systems and computing. The reason for the internship programs is to ensure that students are equipped effectively for prospective employment by answering to the education and training needs of industry and society (Venables and Tan, 2009). Previous studies have investigated the impact of internship experiences of IS students. These studies showed that the internship programs have helped students acquire adequate work experience and obtain career directions (Ali & Smith, 2015), and also acquire industry skills and knowledge (Bukaliya, 2012). The majority of these studies have been evaluated from a business and market perspective (Swanson & Tomkovick, 2011). Today, many universities in developing countries are offering internship programs as part of the requirements for graduating with a computing and information systems degree (Bass & Heeks, 2011).

Yet little, if any, research has been conducted to evaluate the developmental impacts of internship programs even though they have been part of majority of developing countries University computing curriculums and can add to socio-economic development. In view of the above and following Sen's (1999) capability approach (CA) to development, this paper examines how the internship program for IS students in a Nigerian University has contributed to improving their lives. This paper presents a study of, and discusses the human developmental goals that have been enhanced for IS students as a result of their participation in internship programs. One of the main contributions of this research is in operationalizing

the capability approach within the domain of IS education, as well as providing implications for research and policy makers in the education sector. The rest of the paper is organized as follows. The next section summarizes some of the salient points of the capability approach (CA) and some key concepts upon which we based our evaluation of how IS students were able to use their industrial training scheme to improve their lives. The research method, research setting and the analysis of the case are then presented. The final section concludes the paper and provides some implications for research and practice.

## Capability Approach and ICT4D

The capability approach (CA) is a broad normative framework for evaluating social change in terms of enhancement of individual wellbeing (Sen 1999). Sen's CA specifically critiques the functional and opulence approaches to development that usually dominate the discourse on economic development. The CA concentrates on "*human freedom*" which largely refers to the effective opportunities people have to achieve wellbeing. The CA is essentially concerned with two important notions namely "*functionings*" and "*capabilities*". In Sen's (1999) language, "*functionings*" are beings and doings that people value for example being employed or literate, and "*capabilities*" are the freedoms people have to achieve a set of functionings. In other words, the crux of economic development should be people's freedoms to lead the lives they value. An important aspect of the CA, which is vital to understanding the developmental impact of IS internship programs is the separation surrounding commodities (goods and services), capabilities and functionings (beings and doings). The approach values the importance of commodities in improving human wellbeing. As such, a link exists between commodities and capabilities, and in order to achieve and sustain functionings, a number of commodities are required (Alkire & Deneulin, 2009). The ability of an individual to choose amongst capabilities is influenced by conversion factors. Three categories of conversion factors are identified: personal conversion factors comprising sex, reading skills, intelligence; social conversion factors including power relations, social norms, public policies; and environmental conversion factors such as the climate, geographical location (Robeyns, 2005). Furthermore, Sen (1999) noted that achieved functionings are based on an individual's personal choices which are influenced by various decision mechanisms. Lastly, commodities are the vital means and not ends to wellbeing (Robeyns, 2005).

However, the CA which has been primarily developed for social policy evaluations has been criticized for being individualistic and not paying attentions to groups and social structures (Devereux, 2001), an unworkable idea (Robeyns, 2005) and the difficulty in operationalizing for development practice and research (Kleine 2010). Sen (1999) acknowledges that CA has been intentionally underdeveloped so that it can be applicable for a wide range of purposes. Despite the criticism of CA, Coelho et al. (2015) argues that CA provides a strong theoretical lens for evaluating information and communication technologies for development (ICT4D) interventions. Viewing development as the expansion of human freedoms to achieve functionings, ICT can be regarded as a commodity or means to achieve the goal of the development process. In IS studies, there has been an increasing application of the CA by using this basic concept in ICT4D research. In the domain of IS, researchers have made attempts to operationalize the CA to gain a better understanding of the implications of ICTs in development. Sen himself (2010) discusses the role of mobile technologies in enhancing peoples freedoms across the globe. Research applying Sen's ideas to understanding the role of ICT4D can be classified into two groups. One group has empirically operationalized the CA. These studies have drawn on the concepts of commodities, capabilities and functioning to shed light on the values of ICT and the process of assessing them from a development perspective (see Dasuki and Abbott, 2015; Hatakka and Lagsten, 2012; Klein, 2010). The other group examined various angles in which CA can shed light on discussions about design, social justice, and equality in ICTs (see Oosterlaken, 2009; Zheng and Stahl, 2012; Zheng, 2009). Despite the immense potential of CA, there has been a slow uptake in it as a theoretical basis for ICT4D research (Coelho et al., 2015). Heeks (2009, pg. 23) noted that "*operationalizing Sen's work on capabilities and functionings with respect to ICT4D, i.e. understanding how ICT can facilitate the realisation of development as freedom is a yet unfulfilled task*" (pg.23). As such, this study attempts to contribute to the literature by operationalizing the CA to understand how contextual factors enables or restricts individual capabilities in IS student internship programs. The following section discusses the research methodology adopted in conducting the research.

## **Methodology**

In order to analyze the benefit when operationalizing the capability approach, we analyze a case of IS student-participants in an industrial experience scheme in the higher education setting. A broadly interpretive approach was adopted in this study (Walsham, 2006) and was based on interviews and focus groups with students of a private university in Nigeria.

### **Participants**

The participants in the study are undergraduates' students of the faculty of applied sciences and computing at a private university in Nigeria. The major degree programmes offered at the faculty include Computer Science, Information Technology, Software Engineering, and Information Systems Management. Hence, the students ICT skills vary. The students selected to take part in this study have undertaken or are participating in the ICT Students Industrial Work Experience Scheme (SIWES). SIWES was established by Industrial Training Fund (ITF) in 1973 to solve the problem of lack of adequate practical skills preparation of graduates of Nigerian tertiary institutions for employment in industries. The scheme is a pre-condition for the award of diploma and degrees in the sciences and technology disciplines in Nigeria Universities, in accordance with the education policy of government (ITF, 2014). The study took place between June and July, 2015 and a total of 49 students were selected to voluntarily participate in the study.

### **Data Collection Method**

Out of the 49 students involved in the study, 23 were students who had completed their SIWES and 26 were still participating in the scheme, were selected for interviews. Also a focus group with the participants was conducted on two different occasions. In both the interviews and focus group, we asked the students about their experiences in the SIWES scheme and its impacts on the lives. Each interview lasted between thirty minutes to one hour, and was conducted within a month. A time table for the interview which provided the chosen students, the time and location of the interview was developed. The interviews were usually conducted at the staff lounge of the faculty building. Usually, students participating in the SIWES program are required to attend a compulsory zero credit English communication skills class at the university campus every Friday between 4pm to 6pm. The authors' used this class periods on Friday to organize a focus group with the students immediately after their classes and also invited the older students who had completed their SIWES program. Two focus group sessions took place and lasted between one and two hours. During the focus group, notes were been taken by one of the authors.

Both questions for interviews and focus groups were designed using the concepts of the capability approach: background of the students, what ICT programs/tools they were able to use while participating in the SIWES programs, how these ICT programs/tools impacted their lives, what factors affected them from transforming these ICT programs/tools into beneficial outcomes. Overall, a total of eight (8) hours of the interview and 16 page notes were gathered, classified and analyzed. All data compiled were analyzed using qualitative data analysis. The set of principles of thematic analysis by Braun and Clark (2006) were used to analyze the qualitative data. This process commenced with careful read and re-reading of the compiled data in order to get a synopsis of the major themes discussed by the students. Subsequently, a set of themes were generated in relation to the capability approach framework, but with careful consideration given to emergent topics.

## **Data Analysis and Discussion**

We concentrated on the aspect of the capability approach that looks at conversion from commodities to capabilities in the analysis of the case study. We looked at both the SIWES program and the resources that students used while participating in this scheme. Next, we looked at the capabilities afforded to the students as a result of participating in the SIWES program. Finally, we looked at the conversion factors, that is, the factors that enable or restrict the students from transforming the SIWES scheme into capabilities.

## Commodities

Here, we discuss the type of resources the students used during the SIWES program. The student's resources are categorized into education resources and work resources. For educational resources, the students had to use resources such as video tutorials, eBooks, academic websites, and journal publications to learn about any new technology or increase their knowledge about existing information, software or hardware. The students used the internet sites including Google, Google scholar, YouTube and other social media platforms and websites to find all these materials. For work reasons, the main tools were software in areas of networking, database, web programming and modelling. Hardware included laptops, desktops, servers, routers, and cables. Additionally, many students got supportive instruction such as training on how to go about their job roles. Also, all of the participants had to attend an English communication skill course which can be identified as a supportive education.

## Social Capabilities

From a social perspective, the SIWES program had several outcomes in relation to the students' education. The SIWES program provided the students the opportunities to apply theory and practice gained from their academic experience, and also to appreciate the significance of their degree program. Some students noted that the internship experience is completely different from the lab experiments and cannot be replaced by laboratories as shown in the quote below:

*"Although we were taught crimping of network cables during our networking course, in my internship I served as a network engineer of the ICT department at the National assembly, apart from crimping RJ45 cables, I have been laying fibre optic cable, setting up, testing and implementation of routers and the whole networking infrastructure of the complex. It's an experience beyond what I have been taught at the university"*

Some students also used the SIWES program to gain additional academic advantage. In the university, students are taught programming languages such as Java, C sharp, Python, HTML and other languages such as SQL for databases. However, many of the students came back with new programming skills such as Object C, CHTML, Java for Android and business process modelling skills. Most of the students who had completed or were in the SIWES program exhibited marked improvements in academic performance during their final year. Many of them are now more prepared for the design and development of their final year project. According to one of such students:

*"It was my experience in my internship that helped me immensely for my final year project. I used the experience I gained in developing a web application using Object C to prepare my research methods proposal. I actually did very well in the course because I was able to write my entire software development process and the technical functionality to support its success"*

From a pedagogical standpoint and, having been exposed to the outside environment, students were no longer dependent on their lecturers and were more self-reliant in their learning. Before students embarked on the SIWES experience the only sources they had for their learning were lecturers, textbooks and online materials. However, whenever students had challenges during their internship, they developed new ways of solving their problems through self-learning by going to the internet or asking colleagues instead of asking their lecturers. The program also gave students the opportunity to develop their teamwork skills, interpersonal skills and also the ability to learn how to learn. According to one:

*"I was having this exception handling problem in Java, but I couldn't call the lecturer because it'll seem like I didn't learn anything or he didn't teach us anything. Also I did not want to embarrass my university and myself in front of my supervisor, I, therefore, had to do extensive self-learning and also relate with the other two software developers. It has really been a self-learning experience and I have made myself proud"*

Students in the SIWES scheme are required to attend a communication skills course at the university. Fridays are usually work free days for participants. At the end of the term, students are required to take exams for the course. By attending this course, many of the students had become proficient in giving presentations and taking part in meetings with clients, colleagues and suppliers and have improved their business writing skills. The SIWES scheme also exposed students to certification programs. Many participants, having gone into their respective organizations, have either met clients or colleagues who

have IT certifications in areas of project management, business analysis, database management and networking. Many of the students indicated their interest in this certification courses:

*"I am so interested in the networking aspect of computing and my supervisor introduced me to the certification courses and where I can take them. He recommended APTECH or NIIT here in Abuja and told me that with the influx of computer science graduates and the shortage of jobs in the country that I needed the certification to stay ahead of the competition. Currently I am preparing for CCNA in September which is the first stage"*

### **Economic Capabilities**

#### **Access to Finance**

The SIWES program provided the students the opportunity to gain economic advantages. Most prevalent is for earning a salary for an extended period of time. Majority of the students mentioned the financial rewards of the SIWES scheme and the associated implication of reducing overall student debt. Majority of the students were receiving between 10000-15000 Nigerian Naira, equivalent to 61-93 US dollars. Many students were able to pay off accumulated debt, reduce hardship and even save up for their final year as shown in this quote:

*"I damaged my computer twice which my mum paid and then later on I mistakenly broke my laptop screen. My mum didn't agree to pay anymore, but with the money I made from SIWES, I have been able to fix the screen and that's the same laptop I am using for my final year software development"*

The SIWES program also gave students the opportunity to earn potential sponsorships for their final project. Some companies saw the program as an opportunity to interface with students and explore solutions to business challenges; hence return on investment that will exceed the initial cost of engaging an external consultant. Final year projects in the university are usually carried out during the final year of the student and are developed under the direction of the project supervisor and members of the sponsoring organization. Interviews and focus group outcomes indicated that 8 of the students had been sponsored for their project. The following are some students' comments.

*"I am developing a hotel management system for the hotel where I did my internship. They, the hotel management, are the ones sponsoring the project, so I can say that my client, although I get supervisors from the university, are benefitting from my graduation project since the complete solution goes to the hotel"*

*"Well the company I am doing my internship with have asked me to design and develop a web-based biometric system for them. I'll do a presentation at the end of the internship for them. Hopefully, they will be sponsoring the project which will also serve as my final year project"*

Many students also learnt how to write proposals responding to advertised ICT jobs. Some of the participating companies are major beneficiaries of government contracts. Thus some student participants were involved in writing proposals and bids for government jobs as shown in the quote below:

*"During my Internship, I was informed by my boss about a networking project at Ministry of Justice. Based on the knowledge I got from the communication class, I drafted a proposal for tendering. Consequently, while in school after completing the internship, I was called by my boss to inform me they got the job, so he thanked me and later took me out for lunch"*

#### **Access to career opportunities**

From a professional perspective, many students felt the SIWES scheme has provided better career choices. The students were able to get valuable work experience in relevant IT areas such as web development, database design and networking. This experience, on the other hand, gave the students the chance to gain an insight into the particular IT area they were interested in and also develop a range of work related skills demanded by employers which will enhance their overall employability. Also, some students were able to make industry contacts and get subsequent job opportunities. One participating student said:

*"I attended the Institute of Software Practitioners of Nigeria consortium in Abuja with my job supervisor and I got the chance to meet people from HUAWEI, MTN, GLO, MTN, IBM, OMATEK and*

*other major IT and telecommunication companies in Nigeria. Some of the people I met told me to call them or email them after my graduation”*

Also, the scheme provide the students the chance of being employed by the employer after graduation. Two students indicated that their host companies were very interested in hiring them once they were done with school. The students felt that they had become more competitive in the job market since their experiences during their internship had exposed them to specialized and direct knowledge thus giving them an edge over other graduate candidates looking for job.

### **Conversion Factors**

A majority of the students revealed their desire to serve as interns in firms or organizations providing some form of payment. However, not all the students were paid any remuneration during their internship. Specifically students serving in public institutions were not paid. One student noted:

*“I am currently working in the database team in the IT department of a government agency. This clearly shows the importance of my course of study. For me their inability to pay salary unlike organizations where my other colleagues are working affected me a little. However, at the end of the day, I feel I my experience is the most important or me”*

While majority of the students agreed that making money shouldn't really be their goal, they still found money to be significant in the areas of transport and meals during the programme. The Industrial Training Fund (ITF) is the public agency in charge of the SIWES program across Nigeria. In 2013, the Director-General announced that the government was facing shortage of funds and as such won't be able to pay students embarking on the scheme in public institutions (DailyTimes, 2013). The director noted that the lack of remuneration was due to an increasing number of students embarking on the program (Oyeleke, 2013). Socioeconomic inequalities are exacerbated by unpaid internships since they reduce opportunities for the students working in public institutions, and they raise the question of equal access to opportunity.

Another issue that has effect on the students in the SIWES program was their inability to locate and register with participating companies on time, with some students taking up to one month before they could get a company to embark on a program that is supposed to be of three month duration. Many students were sometimes rejected by potential employers before getting a place for SIWES. According to one such student:

*“I went to four places before I was finally accepted for SIWES. Many of the companies usually tell us that they either don't employ interns or do not have a place for interns even if you tell them it's an unpaid intern. I later got a place where my father's friend worked”*

Some students got the places through friends and families while others where recommended by the university. Those who were facing challenges finding a place were later absorbed into the IT department of the university. However, at this time unemployment was a major problem facing the country. Majority of the graduates usually got employed through friends and family, a concept known as “*man-know-man*” or nepotism (Akingbade et al, 2010). Man-know-man is somehow considered as normal in Nigeria and those that are unwilling to support friends and relatives are usually considered unfriendly in the society (Akingbade et al, 2010). As noted earlier, students enrolled in the SIWES scheme are required to attend a compulsory English course scheduled for Friday afternoons in order to improve their business communication skills. However, the compulsory English courses have forced students to undertake their SIWES program only in companies located in Abuja thus depriving them the opportunity of conducting their internship in bigger telecommunication companies which usually had their headquarters located in Lagos, the business city of Nigeria. A student lamented:

*“I got the opportunity to go to Google in Lagos for my IT, but the Friday English class didn't allow me because attendance is compulsory. Here, I am in a small IT firm, where I am not really doing much. You can imagine the vast experience I would have gotten in a company like Google”*

The English class not only deprived students the opportunity to look for internship outside the Abuja, but also deprive the students the opportunity to even travel beyond the outskirts of the Abuja market for external projects. According to an affected student;

*“Where I was working, we were supposed to travel over the weekend to monitor one of the company’s projects in Kano where the company was implementing a university management system. But, because of the Friday class, I was unable to go with the project team. I am sure I missed a lot by been absent”*

Social arrangements and institutions also had an effect on the SIWES program. The main enabler or restriction was related to the infrastructure of the employers. The private organizations involved in the SIWES program all had IT departments that were adequately equipped with the relevant IT infrastructures. Most students doing the internship there were involved in various ICT projects involving databases, networking, and web development. However, majority of the students who worked in the public organizations complained about the lack of infrastructures and technology tools to get hands-on experience. Many of the students felt they were not gaining technological skills by working in public institutions since majority of their work places were manually inclined. According to a participant:

*“Since I started my internship, I haven’t been doing much work because there is really nothing for me to do. Although I have been assigned to the IT department I haven’t been doing much really. We only have two computers and a printer which are used for word processing only. Mostly all I do is make tea for my boss, buy newspapers or do some typing and printing....I am more of a secretary”*

In Nigeria, the public sector has been characterized by inefficiencies due to inadequate funding, poor infrastructure and non-enabling working environment. Ojo (2014) noted that the Nigeria civil service has not been able to implement ICTs effectively into its public service delivery. He argues that all their operations are manually done with limited exceptions. The use of computer, e-mail, and other ICT tools for maximum performance is still limited. Files are still being pushed from one tray to the other when such communications could have been more effectively done via e-mail. Also, poor work supervision could also be a factor affecting the students SIWES program. Some students were given job roles without proper supervision, training and guidance as shown in the student quote below:

*“Immediately I started work, I was told to start using Matlab for some mathematical modelling the agency was doing research on. This task is not even related to my field of studies. I was never trained on the software and even my own supervisor doesn’t know anything about it. He couldn’t even use the computer properly. I had to spend extra hours learning the basics...I was disappointed”*

In Nigeria, many graduates are forced take job roles that are not suited to them due to high rate of unemployment, and, in our case, many student participants took such job roles to satisfy the SIWES requirements of the university. Also, there have been reports of many unfit IT supervisors and managers for overseeing the student job roles. Suleiman (2008) noted that many public sector staff are unable to perform simple work-related process tasks on the computer. He goes further to state that many workers in the public sector use fake or forged certificates. Indeed, if any in-depth verification of qualifications is to be undertaken in the sector, many employees would be let go. In summary, the findings of the study showed that students who undertook their internship in the public sector were faced with more challenges during their SIWES program than their counterparts in the private sector.

## Conclusion

In this paper we evaluated the developmental impact of the IS Students Industrial Work Experience Scheme (SIWES) in Nigeria. The study was informed by Sen’s (1999) capability approach, which was used to highlight the conversion from commodities to capabilities. Viewing development as the expansion of human capabilities IS students’ internship program was conceptualized, as a means to achieving human development in which a set of conversion factors are needed to be in place. The conversion factors which have effect on the agency freedom and wellbeing freedom of individuals, is as important, if not more, than ensuring the program is integrated in the IS education curriculum. These conversion factors go beyond conditions for the program to be effectively implemented and exploited. The conversion factors are conditions that enable people to do what they find valuable in their lives, with or without the internship program. Such capabilities included literacy, ability to use information tools such as ICT to their advantage and others, to express their opinions. This study has contributed to research by showing the impact IS students’ internship program can have on development and how it can be examined using CA.

The relevance of Sen's capability approach for this study has been in highlighting the fact that rather than maximizing access to IS internship programs in the education sector such as the SIWES scheme, such interventions should take into account the needs of the students in order to enhance both their well-being and agency freedom. In this study, the non-payment of salary to some student interns resulted in capability deprivation of these students to support themselves. The poor infrastructure and governance gave rise to the capability deprivation of some students to engage and acquire the relevant skills at their work places. Lastly, the agency of the students was not properly considered. In other words, during the design of the SIWES scheme the student was not involved, nor were the local needs properly accounted for to make it meaningful to them as in the case of students wanting to carry out the SIWES program in companies outside the capital territory. Students were restricted to look for companies in the capital hence depriving them the opportunities to work in other companies located in other cities. Thus, to achieve an effective and successful implementation of the students' SIWES scheme, there is need for a shift from the introduction of program for merely gaining work experience and pay attention to the societal context. Such a shift would serve to improve people's freedom to improve their wellbeing. The main limitation of this study is that it was a single case study which was conducted under severe time frame. There is, therefore, a need for longitudinal studies in order to produce more insight on developmental issues as students in the tertiary education sector continue to participate in the industrial work scheme program.



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